All India Test Series (2023-24)

Test Code: ANY/01

AITS TEST - 01

YAKEEN NEET

DURATION: 200 Minutes | **DATE: 26/11/2023** | **M. MARKS: 720**

Topics Covered

Physics:	Basic Maths & Calculus Vector, Units & Measurement {including measuring instrument}, Motion in a Straight line {including question based on calculus and graphs}, Motion in Plane, Newton law of Motion, Friction
Chemistry:	Some Basic Concepts of Chemistry, Redox Reaction, Atomic structure
Botany:	Cell: The Unit of Life, Cell Cycle and Cell Division, The Living World, Biological Classifications
Zoology:	Structural Organization in Animals, Breathing and Exchange of Gases, Body Fluids and Circulation

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section-B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

OMR Bar Code Number: _____

Student's Signature: _____ Invigilator's Signature _____

(PHYSICS)

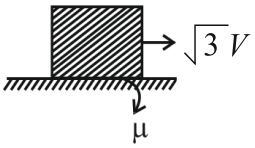
SECTION-A

1. For all real values of x, the minimum value of $f(x) = (x^2 + 2x - 15)\,x$ is;

(1) $\frac{200}{27}$ (2) $-\frac{400}{27}$

(3) $\frac{400}{27}$ (4) $-\frac{400}{9}$

2. A block starts with an initial velocity ($\sqrt{3}V$) on a rough horizontal surface, if the coefficient of sliding friction between the block and the surface is μ, then the time taken by the block to come to rest is?



(1) $\frac{V}{\sqrt{3}\mu g}$ (2) $\frac{\sqrt{3}V}{\mu g}$

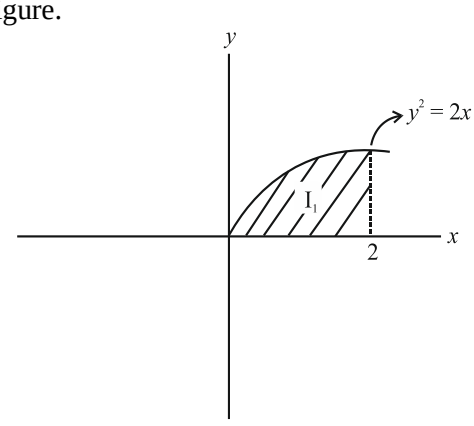
(3) $\frac{\sqrt{2}V}{3\mu g}$ (4) $\frac{\sqrt{3}V}{2\mu g}$

3. $\int \sin(3x+5)\,dx = -\frac{1}{a}\cos(3x+b) + constant$, then the values of a and b respectively are;

(1) 3, 4 (2) 2, 3

(3) 4, 4 (4) 3, 5

4. Find the area of the shaded region as shown in the figure.



(1) $\frac{2}{4}unit^2$ (2) $\frac{1}{3}unit^2$

(3) $\frac{4}{1}unit^2$ (4) $\frac{8}{3}unit^2$

5. Find the maximum or minimum values of the function: $y = 25x^2 + 7 - 11x$

(1) 5.79 (2) 4.79

(3) 7.59 (4) 5.00

6. Two forces, 3N and 4N, act along the line $x = 0$ and $y = 0$ respectively. The equation of the line along which the resultant lies is given by;

(1) $2y = 3x$ (2) $4y = 3x$

(3) $3y = 4x$ (4) $3x = y$

7. A 20 kg block rests on a horizontal surface with a coefficient of friction equal to 0.4. When a horizontal force of 50 N is exerted on the block, then its acceleration will be?
(Consider g = 10 m/s^2)

(1) 1 m/s^2 (2) 2 m/s^2

(3) 4 m/s^2 (4) 0 m/s^2

8. If $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - 2\hat{k}$ and $\vec{c} = 2\hat{i} + 3\hat{j}$, find $\vec{a} \times (\vec{b} \times \vec{c})$

(1) $11\hat{i} + 20\hat{j} - 14\hat{k}$

(2) $-11\hat{i} + 20\hat{j} + 14\hat{k}$

(3) $-11\hat{i} + 20\hat{j} - 14\hat{k}$

(4) $-11\hat{i} - 20\hat{j} - 14\hat{k}$

9. The angle between vectors $\vec{A}$ and $\vec{B}$ is 30º, then the ratio $\frac{\vec{A}.\vec{B}}{|\vec{A} \times \vec{B}|}$ is;

(1) $\frac{1}{\sqrt{3}}$ (2) $\sqrt{3}$

(3) $\frac{1}{2}$ (4) $\frac{\sqrt{3}}{2}$

10. If $\vec{A} = 5\hat{i} - 4\hat{j}$ and $\vec{B} = 7\hat{i} + 8\hat{j}$, then magnitude and direction of $\vec{A} + \vec{B}$ will be;

(1) $4\sqrt{10}$, $\tan^{-1}\frac{1}{3}$

(2) $2\sqrt{10}$, $\tan^{-1}\frac{1}{3}$

(3) $13\sqrt{4}$, $\tan^{-1}\frac{2}{3}$

(4) $3\sqrt{10}$, $\tan^{-1}\frac{3}{2}$

11. The angle between the vectors $(\hat{i} + \hat{k})$ and $(\hat{j} + 3\hat{k})$ is;

(1) $\sin^{-1}\frac{3}{\sqrt{20}}$ (2) $\cot^{-1}\frac{3}{\sqrt{20}}$

(3) $\cos^{-1}\frac{2}{\sqrt{20}}$ (4) $\cos^{-1}\frac{3}{\sqrt{20}}$

12. Find the angle made by the given vector with the *x*, *y* and *z* axis respectively, the vector is $\left[3\hat{i}-\hat{j}+2\hat{k}\right]$.

(1) $\cos^{-1}\frac{2}{\sqrt{14}},\cos^{-1}\frac{-1}{\sqrt{14}},\cos^{-1}\frac{3}{\sqrt{14}}$

(2) $\cos^{-1}\frac{3}{\sqrt{14}},\cos^{-1}\frac{-3}{\sqrt{14}},\cos^{-1}\frac{1}{\sqrt{14}}$

(3) $\cos^{-1}\frac{3}{\sqrt{14}},\cos^{-1}\frac{-1}{\sqrt{14}},\cos^{-1}\frac{2}{\sqrt{14}}$

(4) $\cos^{-1}\frac{3}{\sqrt{14}},\cos^{-1}\frac{1}{\sqrt{14}},\cos^{-1}\frac{2}{\sqrt{14}}$

13. Find the vector that must be added to the sum of vector $\hat{i}-3\hat{j}+2\hat{k}$ and $3\hat{i}+5\hat{j}-4\hat{k}$, so that the resultant vector is a unit vector along the *y*-axis is.

(1) $-4\hat{i}-\hat{j}-2\hat{k}$

(2) $-4\hat{i}-\hat{j}+2\hat{k}$

(3) $4\hat{i}+\hat{j}-2\hat{k}$

(4) $4\hat{i}+\hat{j}+2\hat{k}$

14. Magnitude of component of the vector $\vec{A}=5\hat{i}+2\hat{j}-2\hat{k}$ parallel to a vector $\vec{a}=\hat{i}-\hat{j}+\hat{k}$ is.

(1) $\frac{1}{\sqrt{3}}$ unit (2) $\sqrt{3}$ unit

(3) 1 unit (4) $\frac{4}{\sqrt{3}}$ unit

15. If force (*F*), area (*A*) and mass (*M*) are taken as fundamental quantities, then the dimensional formula of length will be;

(1) $F^0A^2M^0$ (2) $F^0A^{1/2}M^0$

(3) $F^0A^{1/3}M^0$ (4) $F^1A^0M^{1/2}$

16. The acceleration '*a*' (in cm/s^2) of a particle is given in terms of time '*t*' (in 's') by the equation $a=ct^2+\frac{b}{t^2+d}$, the dimension of b, c and d are;

(1) LT^{-4},T^2,L (2) LT^{-1},LT^{-4},T^2

(3) L,LT^{-3},T^3 (4) L,LT^{-4},T^2

17. Given that momentum *P* is given by, *P* = *At* +B, *wh*ere *t* is the time. The unit of *A* is same as that of;

(1) Velocity
(2) Displacement
(3) Momentum
(4) Force

18. In an experiment five quantities *p, q, r, s* and *t* are measured with percentage error 2%, 3%, 4%, 5% and 6% respectively. Quantity *A* is calculated as follows, $A=\frac{p^4q^2r}{s^2t}$, % error in *A* is;

(1) 4%
(2) 14%
(3) 34%
(4) 24%

19. A polythene contains copper powder of mass 15.64g ± .02g. Some of the powder of mass 6.23 g ± .01 g is taken out from it. The mass of the powder left back is:

(1) (9.41 ± 0.03) g
(2) (8.41 ± 0.02) g
(3) (9.41 ± 0.01) g
(4) (9.41 ± 0.04) g

20. The number of significant figures in 0.002935000 is:

(1) 9 (2) 2
(3) 6 (4) 7

21. A screw gauge of pitch 0.5 mm is used to measure the diameter of uniform rod of length 7.9 cm, the main scale reading is 3.5 mm and circular scale reading is 9. The calculated curved surface area of wire to appropriate figures is: (screw gauge has 100 divisions on circular scale).

(1) 4.4 cm^2
(2) 8.8 cm^2
(3) 3.4 cm^2
(4) 2.8 cm^2

22. If velocity of object $V=\sqrt{36-5x}$, find the acceleration of object.

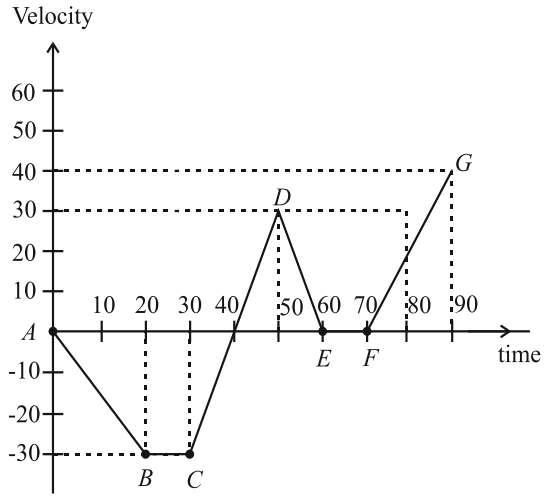
(1) –2.5 m/s^2
(2) 2.0 m/s^2
(3) –4 m/s^2
(4) 5 m/s^2

23. Commencing from a state of rest, what's the proportion of the distance traversed by the body in the 5th second to that traversed in the 4th second?

(1) $\frac{7}{9}$ (2) $\frac{8}{7}$

(3) $\frac{7}{8}$ (4) $\frac{9}{7}$

24. The graph below illustrates the velocity as a function of time for a moving object. What is the maximum positive acceleration observed in this scenario?



(1) FG (2) CD
(3) AB (4) EF

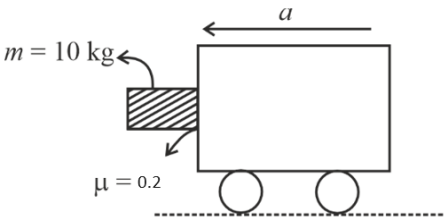
25. The displacement of a moving particle is given by $x = at^5 + bt^3 + ct + d$, the acceleration of particle at $t = 2$ s would be;
(1) $180a + 6b$
(2) $160a + 12b$
(3) $16a + 6b$
(4) $120a + 16b$

26. Which of the following options represents a situation where the acceleration of the object remains constant throughout its motion?
(1) $x = t^4 + 3t^2$
(2) $v = t^3 + 4t^2$
(3) $a = \alpha t^{3/2}$
(4) $v = \sqrt{4x+8}$

27. A man first walks eastward with a velocity 'v' for a time 't' s and then walks northward with the velocity '$2v$' for time 't' s. What is the average velocity of the man during this entire journey?
(1) $\frac{\sqrt{5}v}{2}$ m/s (2) $\frac{\sqrt{5}v}{3}$ m/s
(3) $\frac{\sqrt{3}v}{2}$ m/s (4) $\frac{3v}{2}$ m/s

28. At what time do two objects, one falling from a height of 15 meter and the other launched upwards from the ground and rising to a height of 60 meters, cross paths? {$g = 10$ m/s^2}
(1) 0.12 s (2) 0.18 s
(3) 0.43 s (4) 0.53 s

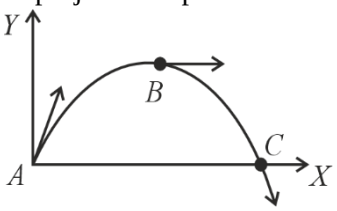
29. In the given scenario, there is a block with mass l0 kg in contact with cart, as illustrated in the figure, the condition of the cart's acceleration that ensures the block doesn't fall can be described as;



(1) $a \geq 5g$ (2) $a \geq 4g$
(3) $a \geq \frac{5}{2}g$ (4) $a \geq g$

30. A bird is heading north with a velocity of V_b and a train is moving towards east with a velocity V_t. What is the resultant velocity of the bird from the perspective of someone on the train.
(1) V_b towards north
(2) $\sqrt{V_b^2 + V_t^2}$ towards north-west
(3) V_t towards east
(4) $\sqrt{V_b^2 + V_t^2}$ towards north-east

31. At the starting point A, a projectile is given an initial velocity ($7\hat{i} + 8\hat{j}$) m/s. Calculate the velocity (in m/s) of the projectile at point B.



(1) $7\hat{i} - 8\hat{j}$ (2) $-8\hat{i} + 7\hat{j}$
(3) $7\hat{i}$ (4) $8\hat{i}$

32. **Assertion (A):** The time of flight of a projectile depends on its initial velocity and the angle of projection.
Reason (R): The time of flight is determined by the horizontal motion of the projectile.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

33. What is the mass of a body experiencing an acceleration of 3m/s^2 when subjected to a force $F = 7\hat{i} - 5\hat{j} + 12\hat{k}$?

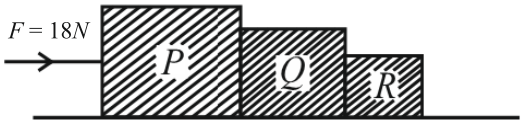
(1) $\frac{\sqrt{218}}{4}$kg (2) $\frac{\sqrt{218}}{3}$kg

(3) $\frac{\sqrt{169}}{3}$kg (4) $\frac{\sqrt{219}}{5}$kg

34. What is the mass of the lift if the tension in the supporting cable is 5500 N when a 80 kg person inside a lift presses the button on the control panel, and the lift starts moving upward with an acceleration of 2 m/s^2, given that the acceleration due to gravity (g) is 10 m/s^2?

(1) 378.3 kg
(2) 940 kg
(3) 278.3 kg
(4) 920.2 kg

35. Three blocks *P*, *Q* and *R* of masses 8 kg, 4kg and 2 kg respectively, are in contact on a frictionless surface, as shown. If a force of 18 N is applied on the 8 kg block, then the contact forces between *Q* and *R* is;

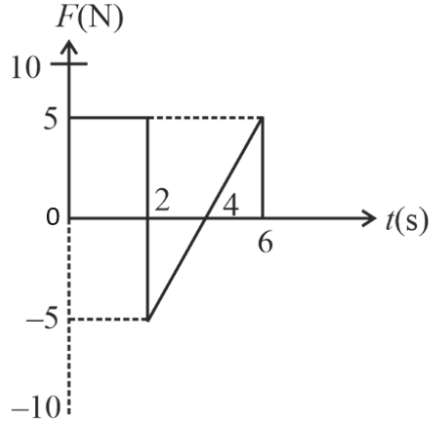


(1) $\frac{18}{7}N$ (2) $\frac{14}{7}N$

(3) $\frac{54}{7}N$ (4) $\frac{24}{7}N$

SECTION-B

36. For the given force-time graph illustrating the Force (*F*) acting on a particle of mass (*m*), determine the change in momentum during the period from 0 to 6 seconds.



(1) 24 N-s (2) 20 N-s
(3) 10 N-s (4) 5 N-s

37. $x = 2 - y - y^2 + 5x$, find $\int_{-3}^{4} xdy$

(1) $\frac{119}{12}$ (2) $-\frac{119}{14}$

(3) $\frac{119}{24}$ (4) $\frac{119}{34}$

38. A stone is launched from the ground with an initial velocity at a certain angle with the horizontal. The horizontal and vertical displacement vary with time '*t*' in seconds according to the following equations: $x = 13\sqrt{3}t$ m, $y = 20\sqrt{3}t - \frac{1}{2}\times 40\sqrt{5}t^2$ m. What is the maximum height reached by the stone and at what time does it reach this height?

(1) $2\sqrt{5}$ m, $\sqrt{\frac{3}{10}}$ s

(2) $3\sqrt{5}$ m, $\sqrt{\frac{3}{20}}$ s

(3) $3\sqrt{5}$ m, $\sqrt{\frac{3}{10}}$ s

(4) $3\sqrt{5}$ m, $\sqrt{\frac{3}{40}}$ s

39. An inclined plane is divided into two sections: the upper $\frac{1}{4}$ is smooth and the lower $\frac{3}{4}$ is rough. If a block starts from rest at the top of the plane and comes to rest again at the bottom, then the required coefficient of friction between the block and the lower $\frac{3}{4}$ of the plane should be;

(1) $\frac{3}{4}\cot\theta$ (2) $\frac{3}{4}\tan\theta$

(3) $\frac{4}{3}\cot\theta$ (4) $\frac{4}{3}\tan\theta$

40. If $|\vec{A}_1| = 2$, $|\vec{A}_2| = 5$ and $|\vec{A}_1 + \vec{A}_2| = 5$ find the value of $\left[\left(\vec{A}_1 + 3\vec{A}_2\right).\left(4\vec{A}_1 - 5\vec{A}_2\right)\right]$

(1) 373 (2) 363
(3) –363 (4) –373

41. An object is shot into the air at an angle of θ from vertical with an initial speed of *U*. At the highest point of its trajectory, what is the radius of curvature of its path?

(1) $\frac{U^2\sin^2\theta}{g}$ (2) $\frac{U^2\cos^2\theta}{g}$

(3) $\frac{U^2\sin^2\theta}{2g}$ (4) $\frac{U^2\cos^2\theta}{2g}$

42. What is the horizontal acceleration required for 10 kg triangular block with angles 45°, 45°, 90°, resting on a smooth table with 45°-90° side down, to keep a 2kg cubical block stationary on its 45°-45° side while accelerating?

(1) $\frac{g}{\sqrt{3}}$ (2) $\sqrt{2}g$

(3) g (4) $\frac{g}{\sqrt{2}}$

43. A body of mass 3 kg at rest, is acted upon by three forces: $\vec{F}_1 = 2\hat{i} + 3\hat{j}, \vec{F}_2 = \hat{i} - \hat{k}$, $\vec{F}_3 = 3\hat{i} - 4\hat{k}$, the acceleration of the body is;

(1) $\frac{3}{5}\hat{i} + \frac{3}{5}\hat{j} - \frac{5}{3}\hat{k}$ (2) $2\hat{i} + \hat{j} - \frac{5}{3}\hat{k}$

(3) $\frac{3}{5}\hat{i} + 3\hat{j} + \frac{5}{3}\hat{k}$ (4) $3\hat{i} - \hat{j} + \frac{5}{3}\hat{k}$

44. **Assertion (A):** The slope of a velocity-time graph represents acceleration.
Reason (R): The area under acceleration-time graph represents the change in displacement.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

45. What is the value of linear velocity, if $\vec{r} = 5\hat{i} - 8\hat{j} + 7\hat{k}$ and $\vec{\omega} = 5\hat{i} + 6\hat{j} - 10\hat{k}$?

(1) $-38\hat{i} - 85\hat{j} - 70\hat{k}$
(2) $-18\hat{i} - 13\hat{j} + 2\hat{k}$
(3) $85\hat{i} - 122\hat{j} + 70\hat{k}$
(4) $18\hat{i} - 81\hat{j} + 70\hat{k}$

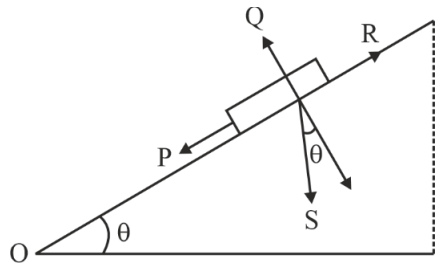
46. Consider a scenario with two objects moving along the same straight line. Object *A* is accelerating, and Object *B* is moving at a constant velocity. Which of the following statements is true?

A. Object A will always have a greater velocity than Object B.
B. Object A can have both a greater velocity and a greater acceleration than Object B at certain points in time.
C. Object A will always have a greater acceleration than Object B.
D. None of the above statements are true.

(1) A and C are correct
(2) B and C are correct
(3) A and D are correct
(4) All are the correct

47. When a body of mass '*m*' just begins to slide as shown?
Match **List-I** with **List-II** to find out the **correct** option.

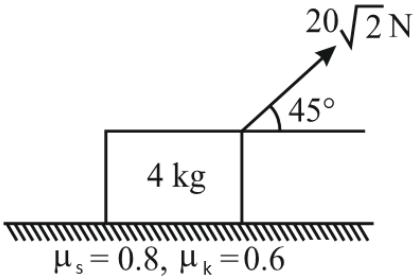
List-I		**List-II**	
(I)	Normal reaction	(A)	P
(II)	Frictional force (f_s)	(B)	Q
(III)	Weight (mg)	(C)	R
(IV)	mg sin θ	(D)	S



Choose the correct answer from the options given below.

	I	**II**	**III**	**IV**
(1)	B	A	C	D
(2)	D	B	C	A
(3)	D	C	B	A
(4)	B	C	D	A

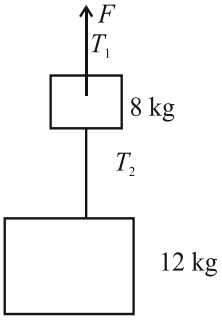
48. In the diagram shown in figure, match the following lists (take, $g = 10\ ms^{-2}$)



List-I		**List-II**	
(I)	Normal reaction	(A)	12 SI unit
(II)	Force of friction	(B)	20 SI unit
(III)	Acceleration of block	(C)	16 SI unit
(IV)	Limiting friction	(D)	2 SI unit

(1) I-B, II-A, III-D, IV-C
(2) I-C, II-D, III-A, IV-B
(3) I-A, II-C, III-B, IV-D
(4) I-D, II-B, III-A, IV-C

49. In the diagram, two blocks are connected by a string. The upper block is suspended by a separate string. When a force $F = 600\ N$ is exerted on the upper string, both blocks accelerate upward at a rate of a m/s^2. If we denote the tensions in the two segments as T_1 and T_2 given that the acceleration due to gravity (g) is 10 m/s^2, which of the following is/are **True**.



I. $a = 20\ \text{m/s}^2, T_2 = 360\ N$

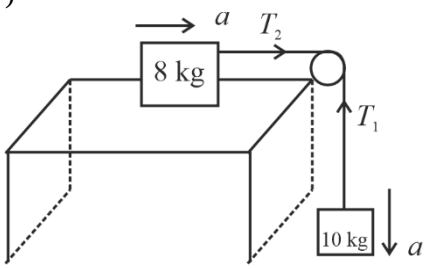
II. $T_1 = 600\ N, T_2 = 360\ N$

III. $a = 40\ \text{m/s}^2, T_1 = 600\ N$

IV. $a = 20\ \text{m/s}^2, T_2 = 600\ N$

(1) I and III are correct
(2) I and II are correct
(3) I and IV are correct
(4) III and II are correct

50. Two masses 8 kg and 10 kg are connected by a string through frictionless pulley and are kept on a frictionless table as shown in the figure. Which of the following statements is/are **correct**. (g = 10 m/s^2)



I. $T_1 = T_2 = \frac{400}{9} N, a = \frac{100}{9}\ \text{m/s}^2$

II. $T_1 \neq T_2$,

III. $T_1 = \frac{200}{9} N, T_2 = \frac{400}{9} N, a = \frac{50}{9}\ \text{m/s}^2$

IV. $T_1 = T_2 = \frac{400}{9} N, a = \frac{50}{9}\ \text{m/s}^2$

(1) I and IV is correct
(2) II and III is correct
(3) Only IV is correct
(4) I and II is correct

(CHEMISTRY)

SECTION-A

51. 4 moles of SO_2 and 6 moles of O_2 react to form SO_3. Total number of moles of reactant and product in the container when only 70% SO_2 is used is;

(1) 5.5 (2) 8.6
(3) 10.5 (4) 6.9

52. 92g of a compound on analysis gave 24g C, 4g H and 64g O. The empirical formula of compound is;

(1) $C_2H_4O_2$ (2) $C_2H_2O_2$
(3) CH_2O_2 (4) CH_2O

53. In a compound C, H and O are present in 6 : 1 : 4 by weight. If molecular weight of the compound is 88, then the molecular formula of the compound is;

(1) $C_2H_6O_2$ (2) C_3H_4O
(3) $C_4H_8O_2$ (4) $C_9H_{12}O_3$

54. Calculate the total number of moles in 5.6 L N_2.

(1) 0.5 (2) 0.75
(3) 0.25 (4) 0.05

55. Experimentally it was found that a metal oxide has formula $M_{0.96}O$. Metal M present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be;

(1) 7% (2) 4%
(3) 8% (4) 5%

56. 0.8 mole of potassium ferricyanide contains C equal to;
(Formula of potassium ferricyanide = $K_3[Fe(CN)_6]$

(1) 45.8g (2) 66.6g
(3) 57.6g (4) 72.8g

57. Calculate the number of neutrons in 1.8 g H_2O.

(1) 1.2 N_A (2) 1.6 N_A
(3) 0.4 N_A (4) 0.8 N_A

58. If 272mL of 0.24 M NaCl solution is diluted with water to a volume of 450mL , the new concentration of solution in **correct** significant figures is;

(1) 0.14 (2) 0.145
(3) 0.144 (4) 0.140

59. Nitrogen and oxygen combines to form N_2O_5 and NO_2 containing 25.92% and 30.43% of Nitrogen respectively by mass, the data illustrates;

(1) Law of conservation of mass.
(2) Law of constant proportions.
(3) Law of reciprocal proportions.
(4) Law of multiple proportions.

60. Which one contains the maximum number of molecules?

(1) 2 mol of N_2
(2) 41 g of dinitrogen
(3) 6.022×10^{24} molecules
(4) 5 g atom of N_2

61. The density of a solution which contains a% by mass of HCl is b. The molarity is;

(1) $\frac{ab}{3.65}$ (2) $\frac{a}{b \times 3.65}$
(3) $\frac{2ab}{3.65}$ (4) $\frac{20 \times ab}{36.5}$

62. Calculate molarity of solution that contains 5.5g HCl in 250 mL solution.

(1) 0.1M (2) 0.6M
(3) 0.3M (4) 0.4M

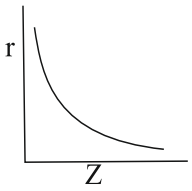
63. **Assertion (A)**: The molality is preferred over molarity to express the concentration of a solution.
Reason (R): Molarity is affected by changing the temperature.

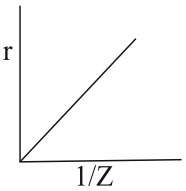
(1) Both **Assertion (A)** and **Reason (R)** is correct and **Reason (R)** is the correct explanation of the **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** is correct but **Reason (R)** is not the correct explanation of the **Assertion (A)**.
(3) **Assertion (A)** is correct but **Reason (R)** is incorrect.
(4) **Assertion (A)** is incorrect but **Reason (R)** is correct.

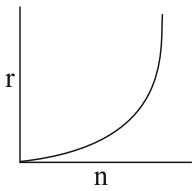
64. Radius of 3^{nd} orbit of $He^+ = x$ calculate radius for 2^{rd} orbit of Be^{+3}

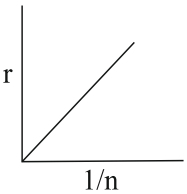
(1) $\frac{9x}{2}$ (2) $\frac{2x}{9}$
(3) $\frac{8x}{9}$ (4) $\frac{8x}{27}$

65. Select the **incorrect** graph for radius of electrons in an orbit vs. Z, $\frac{1}{n}$ and n.

(1) 

(2) 

(3) 

(4) 

66. A certain metal when irradiated with light ($\nu = 3.2 \times 10^{16}$ Hz) emits photo electrons with thrice kinetic energy as did photo electrons when the same metal is irradiated by light ($\nu = 2.0 \times 10^{16}$ Hz) . Calculate threshold frequency of metal?

(1) 2.4×10^{14} Hz
(2) 1.4×10^{16} Hz
(3) 3.6×10^{16} Hz
(4) 1.2×10^{12} Hz

67. What does $|\psi|^2$ represents in quantum mechanical model of atom.

(1) Wavefunction
(2) Maximum probability
(3) Orbit
(4) Orbital

68. The de Broglie wavelength of sand blown by a speed of 25 ms^{-1} wind given that the mass of sand is 5mg.

(1) 3.3×10^{-29} m
(2) 5.3×10^{-30} m
(3) 5.3×10^{-49} m
(4) 3.3×10^{-42} m

69. For which one of the following sets of four quantum numbers an electron will have the highest energy;

	n	**l**	**m**	**s**
(1)	4	2	–1	½
(2)	3	2	1	½
(3)	4	1	0	–½
(4)	5	0	0	–½

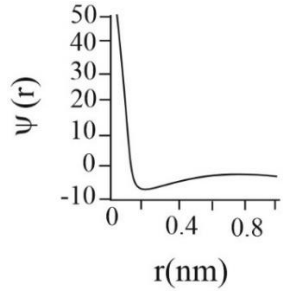
70. Match the **List-I** with **List-II** and choose the correct option.

List-I (Quantum number)		List-II (Orbitals)	
(1)	$n = 3, l = 1, m = \pm 1$	(P)	$2p_x$ or $2p_y$
(2)	$n = 2, l = 1, m = -1$	(Q)	$4dz^2$
(3)	$n = 4, l = 2, m = 0$	(R)	$3p_x$ or $3p_y$
(4)	$n = 3, l = 2, m = \pm 2$	(S)	4 s
(5)	$n = 4, l = 0, m = 0$	(T)	$3\ d_{x^2-y^2}, 3\ d_{xy}$

Choose the **correct** option from the following combinations:

(1) 1-P, 2-Q, 3-R, 4-S, 5-T
(2) 1-T, 2-P, 3-R, 4-Q, 5-S
(3) 1-S, 2-T, 3-P, 4-Q, 5-R
(4) 1-R, 2-P, 3-Q, 4-T, 5-S

71. The graph between ψ (r) and r (radial distance) represents;



(1) 1s orbital (2) 2s orbital
(3) 2p orbital (4) 3s orbital

72. The ratio of the unpaired electrons in Cr(II) and Ni(II) is;

(1) 2 : 1 (2) 2 : 3
(3) 4 : 3 (4) 3 : 4

73. What is the uncertainty in its velocity of a particle of mass 20 g if the uncertainty in its position in space is 3×10^{-4} m ($h = 6.6 \times 10^{-34}$Js)

(1) 8.75×10^{-30} m/s
(2) 2.15×10^{-28} m/s
(3) 7.25×10^{-32} m/s
(4) 9.45×10^{-26} m/s

74. The wavelength of the radiation emitted, when in a hydrogen atom electron falls from infinity to excited 1st state, would be;
(Rydberg constant = 1.097×10^7 m^{-1})

(1) 91 nm (2) 192 nm
(3) 364 nm (4) 9.1 nm

75. The **correct** set of quantum numbers for the unpaired electron of fluorine atom is;

	n	l	m
(1)	2	1	0
(2)	2	1	1
(3)	3	1	1
(4)	3	0	0

76. In which of the following compounds, nitrogen exhibits lowest oxidation state?

(1) N_2O_5 (2) NH_4OH
(3) HN_3 (4) N_2H_4

77. In the following reaction, which element undergoes the maximum change in the oxidation state

$2KClO_3 \rightarrow 2KCl + 3O_2$

(1) K (2) O
(3) Cl (4) None of these

78. The number of electrons required to balance change in the following equation

$Cr_2O_7^{2-} + 14H^+ + ne^- \rightarrow 2Cr^{+3} + 7H_2O$ is

(1) 5 (2) 4
(3) 6 (4) 2

79. In the reaction:

$MnO_4^- + nH_2O + 3e^- \rightarrow MnO_2 + 4OH^-$

What is the value of n.

(1) 5 (2) 8
(3) 2 (4) 3

80. In the reaction $2KMnO_4 + 10FeSO_4 + 8H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 8H_2O$, what will be the equivalent weight of $FeSO_4$?

(1) 152 (2) 75.5
(3) 302 (4) 113.25

81. Which of the following is disproportionation reaction;

A. $Cu^+(aq) \rightarrow Cu^{+2}(aq) + Cu$
B. $P_4 + NaOH + H_2O \rightarrow NaH_2PO_2 + PH_3$
C. $MnO_4^- + e^- \rightarrow MnO_4^{2-}$

(1) A only (2) A and B
(3) C only (4) A, B and C

82. What will be the equivalent weight of $KMnO_4$ in acidic medium If molecular weight of $KMnO_4$ is 'M'.

(1) M/5 (2) M/4
(3) M (4) M/2

83. Which among the following is an oxidising agent;

(1) $MnSO_4$ (2) $KMnO_4$
(3) $MnCl_2$ (4) KCl

84. Number of electrons involved in the conversion of MnO_4^- to MnO_4^{2-}

(1) 2 (2) 4
(3) 1 (4) 3

85. Which of the following compound can act as reducing agent;

(1) $KMnO_4$ (2) H_2S
(3) $Fe_2(SO_4)_3$ (4) $K_2Cr_2O_7$

SECTION-B

86. How many antacid tablets each containing 350mg of $Al(OH)_3$ are needed to neutralize all the HCl produced in one day? Given that a person produces 2.7 litre of gastric juice per day and gastric juice contains 2.8 g of HCl per litre.

(1) 12 (2) 14
(3) 16 (4) 18

87. A 4 L gas mixture of propane and butane on complete combustion at 25°C produced 14 L CO_2. Find out the composition of gas mixture (Propane: butane).

(1) 2:3 (2) 1:2
(3) 1:4 (4) 1:1

88. What will be the minimum molar mass of a compound containing 0.39% of nickel?

(1) 12 kg (2) 15 kg
(3) 17 kg (4) 20 kg

89. There are two aqueous solution of sugar, A and B. Solution A has same value of molarity as molality of solution B. Then the **correct** option about the concentration of both solutions will be;

(1) Solution A will be more concentrated than that of solution B
(2) Solution A will be less concentrated than that of solution B
(3) Solution A will be equally concentrated than that of solution B
(4) None of the above

90. Match the **List-I** with **List-II**.

	List-I (Reaction)		**List-II (At the end)**
A.	$\underset{3mol}{A} + \underset{4mol}{2B} \rightarrow 3C$	P	16/3 moles C formed
B.	$\underset{2mol}{1/2A} + B \rightarrow \underset{2mol}{2C}$	Q	6 moles C formed
C.	$\underset{3mol}{2A} + \underset{2mol}{3B} \rightarrow 2C$	R	4 moles C formed
D.	$\underset{4mol}{3A} + \underset{3mol}{2B} \rightarrow 4C$	S	4/3 moles C formed

(1) A-Q; B-R; C-S; D-P
(2) A-P; B-R; C-Q; D-S
(3) A-R; B-S; C-Q; D-P
(4) A-Q; B-S; C-R; D-P

91. The ratio of the difference in energy between the second and third Bohr orbit to that between third and fourth Bohr orbit is;

(1) $\frac{20}{7}$ (2) $\frac{1}{3}$
(3) $\frac{27}{5}$ (4) $\frac{4}{9}$

92. The second Balmer transition in the Helium spectrum has $\Delta E = -10.2eV$. The same energy change is observed in the first Lyman transition of;

(1) Li^{2+} (2) He^+
(3) H (4) Be^{3+}

93. What will be the change in De Broglie wavelength of electron when applied voltage becomes 4 times?

(1) Increases by 2 times
(2) Decreases by 2 times
(3) Increases by 4 times
(4) Decreases by 4 times

94. An ion with mass number 65 contains positive charge with 2 units and has 25 % more neutrons than electrons. The symbol of this ion will be;

(1) $^{65}_{28}Zn^{2+}$ (2) $^{68}_{28}Cu^{2+}$
(3) $^{65}_{30}Zn^{2+}$ (4) $^{65}_{30}Cu^{2+}$

95. **Assertion (A)**: There is no spherical node in 3 p orbital.

Reason (R): Total number of radial nodes in 3p orbital is 1.

(1) Both **Assertion (A)** and **Reason (R)** are the correct, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the correct, but **Reason (R)** is not a correct explanation of the **Assertion (A)**.
(3) **Assertion (A)** is correct, but **Reason (R)** is incorrect.
(4) **Assertion (A)** is incorrect, but **Reason (R)** is correct

96. Choose the set of coefficients that **correctly** balances the following equation;

$xMnO_4^- + yH^+ + ze^- \rightarrow aMn^{2+} + bH_2O$.

	x	y	z	a	b
(1)	2	14	6	2	7
(2)	1	8	5	1	4
(3)	2	7	6	2	7
(4)	2	7	6	1	7

97. There exists two type of S in $Na_2S_4O_6$. What will be the average oxidation state of S in $Na_2S_4O_6$

(1) +3
(2) +3.5
(3) +2.5
(4) +2

98. What will be the equivalent weight of Fe in the following change if the atomic weight of iron is 56, $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

(1) 84 (2) 21
(3) 63 (4) 42

99. What will be the number of moles of $KMnO_4$ and $K_2Cr_2O_7$ required to oxidize 0.25 mol Sn^{2+} to Sn^{+4} in acidic medium:

(1) 0.05, 0.08 (2) 0.10, 0.08
(3) 0.10, 0.04 (4) 0.05, 0.04

100. Oxidation state of Cr in CrO_5 is;

(1) +4 (2) +10
(3) +6 (4) +3

(BOTANY)

SECTION-A

101. Mitosis or the equational division is usually restricted to ...**A**... cells. However, in some lower plants and in some social insects ...**B**... cells also divide by mitosis.
Choose the **correct** option for **A** and **B** from the given options;

(1) Haploid; diploid (2) Haploid; haploid
(3) Diploid; diploid (4) Diploid; haploid

102. Which of the following vacuole is present in blue-green algae and photosynthetic bacteria?

(1) Food vacuole
(2) Gas vacuole
(3) Contractile vacuole
(4) Sap vacuole

103. In which one of the following options, the two given taxonomic categories are **correctly** matched with their organism?

	Taxonomic Categories	Organism
(1)	*Triticum* and Sapindales	Wheat
(2)	Sapindales and *Mangifera*	Mango
(3)	Canidae and Primata	Gibbon
(4)	*Musca* and Primata	Housefly

104. **Assertion (A):** Viroids are found to be a free RNA.
Reason (R): Viroids lacked the protein coat that is found in viruses.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

105. Select the **correct** statement about G_1 phase;

(1) Cell is metabolically inactive.
(2) G_1 is the interval between mitosis and initiation of DNA replication.
(3) It is not a phase of synthesis of macromolecules
(4) Cell stops growing

106. The non staining, small satellite like structures are formed in chromosome because of;

(1) primary constriction
(2) secondary constriction
(3) centromere
(4) kinetochore

107. Which of the following statements is **correct**?

(1) Asexual reproduction in fungi is by oospores, ascospores and basidiospores.
(2) Fusion of two nuclei between two motile or non-motile gametes called plasmogamy.
(3) Fusion of two protoplasm is called karyogamy.
(4) Meiosis in zygote results in the formation of haploid spores during sexual cycle of fungi.

108. The stage at which chromosome is made up of two sister chromatids and are held together by the centromere is;

(1) Anaphase (2) Telophase
(3) Metaphase (4) Prophase

109. Proteins move within the plasma membrane due to which nature of lipids?

(1) Liquidity (2) Quasi-fluid
(3) Viscosity (4) Stability

110. The period of active mitosis in yeast cell ranges from;
(1) four to five minutes
(2) a few hours to one day
(3) one day to a week
(4) less than a minute

111. All the universal rules of ICBN are correct among the following except
(1) Handwritten scientific names should be separately underlined
(2) Every species should have a generic name and a specific epithet
(3) Scientific names are generally in Latin and should be italicized
(4) Generic and specific names should be written starting with small letters

112. **Assertion (A):** Reproduction is an all-inclusive defining characteristic of living organisms.
Reason (R): Mules, sterile worker bees, infertile human couples, etc are organisms that cannot reproduce.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of Assertion (A).
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

113. The end of pachytene is recognised by;
(1) completion of recombination.
(2) formation of synaptonemal complex.
(3) bivalent formation.
(4) chromosomes alignment on equatorial plate.

114. Consider the following statements;
(I) The centromere is termed as the secondary constriction of a chromosome.
(II) The secondary constrictions are non-staining regions.
(III) The chromosomes are visible only in dividing cells.
(IV) The chromosomes bend at the secondary constrictions when they are pulled at anaphase.
Which of the above statements are **false**?
(1) I, II and III only
(2) I and IV only
(3) II, III and IV only
(4) I, II, III and IV

115. **Assertion (A):** Consciousness is considered as the defining property of living organisms.
Reason (R): All organisms are 'aware' of their surroundings.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of Assertion (A).
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

116. Which of the following structures is not synthesised by microtubules?
(1) Vacuole
(2) Centriole
(3) Flagella
(4) Spindle fibres

117. Lichens grow luxuriantly where the
(1) trees are very healthy
(2) trees are heavily infested
(3) location is highly polluted
(4) location is not polluted

118. Movement of sister chromatids toward opposite poles of the cell occurs by;
(1) Shortening of microtubules attached to centromere.
(2) Shortening of microtubules attached to kinetochores.
(3) Shortening of microtubules attached to metaphase plate.
(4) Shortening of microtubules attached to other homologous chromosomes.

119. Consider the following four statements **(I-IV)** related to cell cycle, and select the **correct** option stating them as true **(T)** or false **(F)**.
I. M-phase is the phase of actual cell division.
II. Interphase is the shortest duration of cell cycle.
III. The number of chromosomes doubles in S-phase.
IV. The cell that does not divide further exits G_1-phase to enter a metabolically inactive stage.
(1) (I-T), (II-F), (III-F), (IV-F)
(2) (I-F), (II-T), (III-T), (IV-T)
(3) (I-F), (II-F), (III-T), (IV-T)
(4) (I-T), (II-F), (III-F), (IV-T)

120. Match taxonomic categories with their respective examples and choose the **correct** option;

List I		List II	
I	Family	**A**	*domestica*
II	Phylum	**B**	Diptera
III	Order	**C**	*Musca*
IV	Species	**D**	Arthropoda
V	Genus	**E**	Muscidae

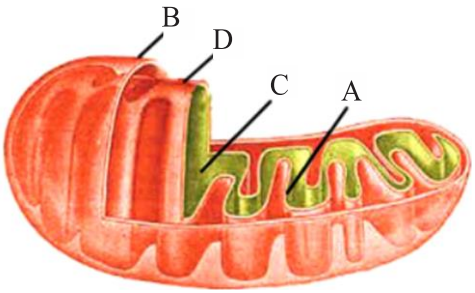
(1) (I-D), (II-C), (III-E), (IV-B), (V-A)
(2) (I-E), (II-D), (III-B), (IV-A), (V-C)
(3) (I-D), (II-E), (III-B), (IV-A), (V-C)
(4) (I-E), (II-C), (III-B), (IV-A), (V-D)

121. Consider the following statements and choose the **correct** option;

I. The organelles of endomembrane system have no coordinated functions.
II. The endomembrane system includes plasma membrane, ER, golgi complex, lysosomes and vacuoles.
III. ER helps in the transport of substances, synthesis of proteins, lipoproteins and glycogen.
IV. Ribosomes are involved in protein synthesis.

(1) III and IV correct
(2) Only I is correct
(3) Only II is correct
(4) Only III is correct

122. Select the part **correctly** matched with its function;



(1) Part (C): Matrix – major site for photosynthesis enzymes
(2) Part (B): Outer membrane – gives rise to inner membrane by splitting
(3) Part (D): Inner membrane – forms infoldings called cristae
(4) Part (A): Cristae – possess single circular DNA molecule and ribosome

123. The X-shaped structure called chiasmata is observed during;

(1) zygote (2) diplotene
(3) leptotene (4) pachytene

124. **Assertion (A):** From species to kingdom, the number of common characteristics goes on decreasing.
Reason (R): Higher the category, lesser is the difficulty of determining the relationship to other taxa at the same level.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

125. The short-lived stage between two meiotic divisions;

(1) is long lasting in some cells.
(2) involves S phase.
(3) in between subphases of meiosis I.
(4) shows no DNA replication.

126. Identify the true statements from the following and choose the **correct** option.

I. No non-living object exhibits metabolism.
II. Brain-dead human patients have self-consciousness.
III. Each rank or taxon represents a unit of nomenclature.
IV. Based on characteristics, all living organisms can be classified into various taxa.

(1) I and II
(2) I and IV
(3) I and III
(4) III and IV

127. Read the following statements and select the **correct** option.
Statement I: Archaebacteria live in some of the most harsh habitat conditions.
Statement II: The archaebacteria and other bacteria have same type of cell wall structure.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

128. Schwann proposed that;
(1) cell wall is not a unique character of the plant cell.
(2) all plants are composed of different kinds of cells which form the tissues of the plant.
(3) bodies of animals and plants are made up of cells and its products.
(4) cells divide and new cells are formed from pre-existing cells.

129. Read the following statements & choose the **correct** option.
Statement I: Internal growth occurs due to synthesis of protoplasmic substances.
Statement II: In unicelled organisms, reproduction is not synonymous with growth.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

130. Animals are named according to ICZN, it stands for;
(1) Indian Congress of Zoological Nomenclature.
(2) International Code of Zoological Nomenclature
(3) Indian Code of Zoological Nomenclature
(4) International Congress of Zoological Names

131. Select the **odd one** out w.r.t. family Felidae.
(1) Dogs
(2) Cats
(3) Tiger
(4) Leopard

132. Match the lists & choose the **correct** option;

List-I		**List-II**	
I	Plasmodium	A	Diatoms
II	Mixotrophic nutrition	B	Euglenoids
III	Red tide	C	Dinoflagellates
IV	Oceanic chief producers	D	Slime moulds

	I	**II**	**III**	**IV**
(1)	D	B	C	A
(2)	A	B	C	D
(3)	B	C	D	A
(4)	C	B	A	D

133. Read the following statements & choose the **correct** option;
Statement I: Viruses that infect plants have ssRNA.
Statement II: Viruses that infect animals have either single or double stranded RNA or dsDNA.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

134. Which one of the following matches is **correct**?

A	*Mucor*	Septate Mycelium	Ascomycetes
B	*Trichoderma*	Sexual reproduction absent	Deuteromycetes
C	*Rhizopus*	Reproduction by conjugation	Ascomycetes
D	*Agaricus*	Parasitic fungus	Deuteromycetes

(1) A (2) B
(3) C (4) D

135. Read the following statements and choose the option which is **true** for them.
Statement I: The movement of molecules across the membrane without any requirement of energy is called the passive transport.
Statement II: Transport of molecules in which ATP is utilised is called active transport.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

SECTION-B

136. Select the **correct** sequence of taxonomic categories of Mango in descending order;
(1) *Mangifera* → Anacardiaceae → Dicotyledonae → Sapindales → Angiospermae
(2) *Mangifera* → Anacardiaceae → Sapindales → Dicotyledonae → Angiospermae
(3) Angiospermae → Dicotyledonae → Sapindales → Anacardiaceae → *Mangifera*
(4) Angiospermae → Sapindales → Anacardiaceae → Dicotyledonae → *Mangifera*

137. In some prokaryotes like cyanobacteria, there are membranous extensions into the cytoplasm called ___**A**___ which contain ___**B**___.

(1) A-cristae, B-starch
(2) A-pigments, B-chromatophores
(3) A-starch, B-cristae
(4) A-chromatophores, B-pigments

138. Match the features given in list I with their respective phases of cell cycle in list II and select the **correct** option.

List-I		**List-II**	
I	Synapsis pairs homologous chromosomes	**A**	Anaphase II
II	Synthesis of RNA and protein	**B**	Zygotene
III	Action of enzyme recombinase	**C**	G_2-phase
IV	Centromeres do not separate, but chromosomes move towards opposite poles	**D**	Anaphase I
		E	Pachytene

	I	**II**	**III**	**IV**
(1)	E	D	C	B
(2)	B	C	E	D
(3)	A	D	E	C
(4)	A	E	C	B

139. **Assertion (A):** Golgi apparatus remains in close association with the endoplasmic reticulum.
Reason (R): Materials to be packaged in the form of vesicles from the ER fuse with the *cis* face of the Golgi apparatus and move towards the maturing face.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

140. Which of the following features are **correct** regarding ribosomes?

I. Composed of RNA and proteins.
II. Eukaryotic ribosomes are 70S while prokaryotic ribosomes are 80S.
III. Not surrounded by any membrane.
IV. Take part in protein synthesis.

(1) Only II (2) I and II
(3) I, II, III and IV (4) I, III and IV

141. Read the given statements and select the **correct** option.

Statement I: All single celled eukaryotes are placed under protista.

Statement II: Protista include chrysophytes, dinoflagellates, protozoans, fungi and eubacteria.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

142. Select the **odd one** w.r.t. kingdom plantae.

(1) Includes all eukaryotic chlorophyll-containing organisms.
(2) A few members are partially heterotrophic.
(3) Plantae includes algae, fungi, bryophytes and pteridophytes.
(4) Life cycle of plants has two distinct phases the diploid sporophytic and the haploid gametophytic that alternate with each other.

143. **Assertion (A):** Meiosis increases the genetic variability in organisms from one generation to the next.
Reason (R): Variations are important for the process of evolution.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

144. State the following statements as true **(T)** or false **(F)** and select the **correct** option.

A. Integral proteins are partially or totally buried in the membrane.
B. Human RBC membrane has approximately 52% proteins.
C. Proteins move laterally within overall layer of plasma membrane.

(1) (A-T), (B-T), (C-T)
(2) (A-F), (B-T), (C-F)
(3) (A-T), (B-F), (C-T)
(4) (A-F), (B-F), (C-T)

145. Read the four statements (A-D) and choose the **correct** option.
A. Condensation of chromosomes is completed by the time cell reaches metaphase.
B. A very significant contribution of mitosis is cell repair.
C. Pachytene stage is relatively short-lived compared to the leptotene.
D. Interkinesis is a short-lived stage characterised by duplication of DNA.
(1) A, B & C are correct
(2) Only C is incorrect
(3) B & D are correct
(4) A & B are correct

146. Select the **correct** statement;
(1) The walls of diatoms are easily destructible.
(2) Diatomaceous earth is formed by the cell walls of diatoms.
(3) Diatoms are non-photosynthetic organisms.
(4) Diatoms are microscopic dinoflagellates.

147. Bovine spongiform encephalopathy (BSE) disease in cattle is caused by an organism which has;
(1) low molecular weight RNA.
(2) abnormally folded protein.
(3) free RNA without protein coat.
(4) free DNA without protein coat.

148. Which of the following comes under class mammalia?
(1) Carnivora, Primata
(2) Diptera, Reptilia
(3) Poales, Reptilia
(4) Diptera, Primata

149. Match the organisms given in **List-I** with their respective features in **List-II**:

List – I		**List-II**	
I	*Puccinia*	**A**	Parasitic fungus on mustard
II	*Neurospora*	**B**	Feed on dead substrates
III	Saprophytes	**C**	Wheat rust pathogen
IV	*Albugo*	**D**	Used for biochemical and genetic Work

Choose the **correct** answer from the options given below:

	I	**II**	**III**	**IV**
(1)	A	B	C	D
(2)	C	D	B	A
(3)	D	C	B	A
(4)	B	A	D	C

150. Read the following statements and choose the option which is **true** for them.
Statement I: In mitosis, chromosomal number in the daughter cells remains the same as in parents.
Statement II: The growth of multicellular organisms is due to mitosis.
(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

(ZOOLOGY)

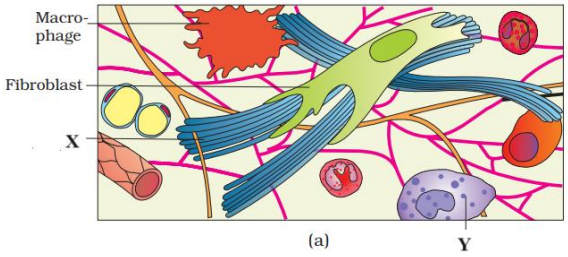
SECTION-A

151. Specialized cells to store fats are present in which of the following tissue?
(1) Dense regular connective tissue
(2) Loose connective tissue
(3) Specialized connective tissue
(4) Epithelial tissue

152. Following statements represents which part of mechanism of breathing?
A. Reduction in thoracic and pulmonary volume.
B. Relaxation of inter-costal muscles.
C. Increase in intra-pulmonary pressure.
D. Diaphragm in its normal position.
(1) Expiration
(2) Inspiration
(3) Forceful inspiration
(4) Inhalation

153. **Statement I:** An injury or a trauma stimulates the platelets in the blood to release certain factors which activate the mechanism of coagulation.
Statement II: A clot or coagulam is formed mainly by a network of threads called fibrinogen in which dead and damaged formed elements of blood are trapped.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

154. In the given figure, correctly identify **X** and **Y**



(1) **X-** Elastin fibres, **Y-** Phagocyte
(2) **X-** Microtubules, **Y-** Macrophage
(3) **X-** Collagen fibres, **Y-** Mast cell
(4) **X-** Collagen, **Y-** Neutrophil

155. Match **List-I** with **List -II** and select the **correct** option.

List -I		**List -II**	
A	Transport of CO_2	I	Haemoglobin
B	Transport of O_2	II	Inspiration
C	Contraction of diaphragm	III	Pneumotaxic centre
D	Regulation of respiration	IV	Carbonic anhydrase

(1) A – IV, B – III, C – II, D – I
(2) A – II, B – I, C – IV, D – III
(3) A – IV, B – I, C – II, D – III
(4) A – IV, B – I, C – III, D – II

156. Which of the following respiratory disorder can be prevented by using protective mask?
(1) Asthma
(2) Emphysema
(3) Cystic fibrosis
(4) Asbestosis

157. **Assertion (A):** Skeletal muscle fibres are bundled together in a parallel fashion enclosed by a sheath of tough connective tissue.
Reason (R): The fibres of skeletal muscles are composed of numerous fine fibrils, called epimysium.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is the correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not the correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

158. In *erythroblastosis foetalis*, **____A___** mother produces antibodies against Rh antigen in her blood. In case of her subsequent pregnancies, these antibodies can leak into the blood of **___B__** and destroy the RBCs.
(1) **A-** Rh^{-ve}; **B-** Rh^{+ve} foetus
(2) **A-** Rh^{-ve}; **B-** Rh^{-ve} foetus
(3) **A-** Rh^{+ve}; **B-**Rh^{-ve} foetus
(4) **A-**Rh^{+ve}; **B-**Rh^{+ve} foetus

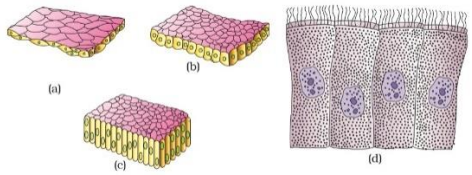
159. Which of the following statements is/are **correct**?
A. When a neuron is suitably stimulated, an electrical disturbance is generated which swiftly travels along its plasma membrane.
B. Neuroglia make up more than one-half the volume of neural tissue in our body.
C. Arrival of the disturbance at the neuron's endings, or output zone, triggers events that may cause stimulation or inhibition of adjacent neurons and other cells.
D. Neural tissue exerts the least control over the body's responsiveness to changing conditions.
(1) A, B and C
(2) B, C and D
(3) B and D
(4) C and D

160. Oxygen dissociation curve is highly useful in studying the effect of **___A____**, **__B___** concentration, etc., on binding of O_2 with **___C____**.

	A	**B**	**C**
(1)	pO_2	Na^+	plasma
(2)	pCO_2	H^+	haemoglobin
(3)	pO_2	H^+	carboxyhemoglobin
(4)	pCO_2	K^+	haemoglobin

161. Read the following from **A-E** and select the **correct** ones for white blood cells.
A. They are nucleated and are relatively lesser in number.
B. They are short lived.
C. A healthy adult man has, on an average, 5 millions to 5.5 millions of WBCs mm^{-3} of blood.
D. They destroy in spleen.
E. They play an important role in the immune system of our body.
(1) A, B, C, E
(2) A, B and E only
(3) B, C, E only
(4) B, C, D only

162. Which of the following labelled figure represents cuboidal simple epithelium?



(1) (a) (2) (b)
(3) (c) (4) (d)

163. How many of the following statements are **correct** for transport of CO_2?

A. CO_2 is carried by haemoglobin as carboxy-haemoglobin.
B. At the tissue site where partial pressure of CO_2 is high due to catabolism, CO_2 diffuses into blood (RBCs and plasma) and forms HCO_3^- and H^+.
C. At the alveolar site where pCO_2 is low, the reaction proceeds in the opposite direction leading to the formation of CO_2 and H_2O.
D. CO_2 trapped as carboxyhaemoglobin at the tissue level and transported to the alveoli and is released out as CO_2.
E. When pCO_2 is high and pO_2 is low as in the tissues, more binding of carbon dioxide occurs whereas, when the pCO_2 is low and pO_2 is high as in the alveoli, dissociation takes place.

(1) Four (2) Five
(3) Three (4) Two

164. **Statement I:** ABO grouping is based on the presence or absence of two surface antigens (chemicals that can induce immune response) on the RBCs namely A and B.
Statement II: No antigens are present on the RBCs of AB blood group.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

165. How many of the following option is/are an example of specialized connective tissue?

A. Fluid connective tissue.
B. Adipose tissue.
C. Ligaments and tendons.
D. Bone and cartilage.

(1) A, B and C
(2) B and C
(3) C only
(4) A and D

166. Which of the following statements are **true** regarding regulation of respiration?

A. Rhythm of respiratory system is controlled by respiratory system of our body.
B. Receptors associated with aortic arch and carotid artery also can recognize changes in CO_2 and H^+ concentration and send necessary signals to the rhythm centre for remedial actions.
C. A specialised centre present in the hypothalamus region of the brain called respiratory rhythm centre is responsible for regulation of respiration.
D. Another centre present in the pons region of the brain called pneumotaxic centre can moderate the functions of the respiratory rhythm centre.

	A	**B**	**C**	**D**
(1)	T	T	F	F
(2)	F	T	F	T
(3)	T	F	T	F
(4)	F	F	T	T

167. Match **List-I** with **List-II** and choose the **correct** option.

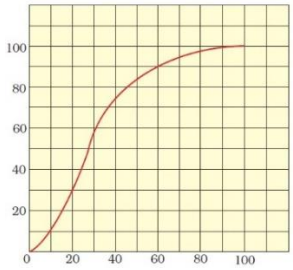
List-I		**List-II**	
A	Mosquito	I	4-chambered heart
B	Earthworm	II	2-chambered heart
C	Fishes	III	Open circulatory system
D	Crocodile	IV	Closed circulatory system

(1) A-III, B-I, C-IV, D-II
(2) A-II, B-III, C-I, D-IV
(3) A-III, B-IV, C-II, D-I
(4) A-II, B-I, C-IV, D-III

168. **Assertion (A):** Adhering junctions perform cementing to keep neighbouring cells together.
Reason (R): Adhering junctions facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small molecules and sometimes big molecules.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is the correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not the correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

169. Which of the following option **correctly** mark the Y-axis of oxygen dissociation curve.



(1) Saturation of haemoglobin with oxygen.
(2) Percentage saturation of haemoglobin with oxygen.
(3) Binding of oxygen with haemoglobin.
(4) dissociation of oxygen from haemoglobin.

170. Human heart is __**A**__ in origin and is protected by double walled membranous bag called ___**B**___ enclosing ___**C**___ fluid.

	A	**B**	**C**
(1)	endodermal	peritoneum	Peritoneal
(2)	ectodermal	pleura	Pleural
(3)	mesodermal	pericardium	pericardial
(4)	myogenic	cardium	cardial

171. **Statement I:** All cells in epithelium are held together with large amount of intercellular material. **Statement II:** In nearly all animal tissues, specialised junctions provide both structural and functional links between its individual cells.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

172. Some air always remains in the lungs which can never be expelled and prevents the collapsing of lungs. This is called ____.
(1) vital capacity
(2) residual volume
(3) functional residual capacity
(4) total lung capacity

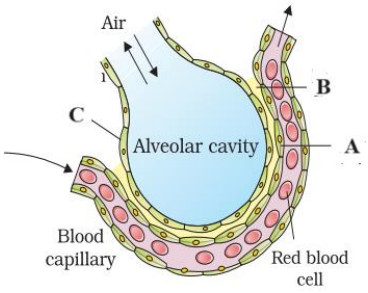
173. Select the **incorrectly** matched pair.
(1) Muscle of arm- Non-striated muscle
(2) Iris- Smooth muscle
(3) Alimentary canal – Involuntary muscle
(4) Wall of heart – cardiac muscle

174. During each cardiac cycle two heart sounds are produced. The reason behind the production of second heart sound is;
(1) opening of AV valves.
(2) closure of semilunar valves after the blood flows into vessels from ventricles.
(3) conduction of signal from SA node to AV node.
(4) atrial contraction.

175. Match the following and choose the **correct** option.

	Tissue	**Location**	**Function**
(1)	Neural tissue	Lungs	Secretion and absorption
(2)	Muscular tissue	Skeleton	Heart contraction
(3)	Epithelial tissue	Brain	Absorption
(4)	Connective tissue	Tendon	Attach skeletal muscle to bones

176. In the given figure identify **A**, **B** and **C**.



	A	**B**	**C**
(1)	Blood	Squamous epithelium of alveolar wall	Basement membrane
(2)	Alveolar cavity	Blood capillary	Basement membrane
(3)	Basement membrane	Squamous epithelium	Endothelium of blood capillary
(4)	Endothelium of blood capillary	Basement membrane	Squamous epithelium of alveolar wall

177. An epithelial tissue having a single layer of tall and slender cells, having nuclei at the base and cilia on the free surface, covers the inner lining of _____.
(1) stomach (2) cheeks
(3) fallopian tubes (4) ovary

178. Given below are four statements **AD** regarding human blood circulatory system.
A. Heart failure means the state of heart when it is not pumping blood effectively enough to meet the needs of the body.
B. Angina is acute chest pain which occurs due to blockage in heart's arteries.
C. Persons with blood group O can donate blood to any person with any blood group under ABO system.
D. Veins have thin walls and wide lumen as compared to arteries.
Which of the above statements are **correct**?
(1) A, C and D (2) A and B
(3) B and C (4) C and D

179. **Assertion (A):** Binding of oxygen with haemoglobin is primarily related to partial pressure of O_2. Partial pressure of CO_2, hydrogen ion concentration and temperature are the other factors which can interfere with this binding.
Reason (R): Each haemoglobin molecule can carry a maximum of four molecules of O_2.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is the correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not the correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

180. Which of the following option **correctly** represents the type of tissue which function as outer lining of cavities, ducts and tubes of body?
(1) Compound epithelim
(2) Simple epithelium
(3) Glandular epithelium
(4) Keratinized epithelium

181. Which of the following statement is **incorrect**?
(1) Gills are the respiratory organ in fishes, aquatic arthropods and molluscs.
(2) Amphibians can respire through lungs and gills only.
(3) Vascularised bags called lungs (pulmonary respiration) are used by the terrestrial vertebrates for the exchange of gases.
(4) Earthworms use their moist cuticle and insects have a network of tubes (tracheal tubes) to transport atmospheric air within the body.

182. Read the following statements and choose the **correct** sequence of steps involved in respiration.
A. Diffusion of gases (O_2 and CO_2) across alveolar membrane.
B. Breathing or pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.
C. Transport of gases by the blood.
D. Utilisation of O_2 by the cells for catabolic reactions and resultant release of CO_2.
E. Diffusion of O_2 and CO_2 between blood and tissues.
(1) A, B, C, D, E (2) B, A, C, E, D
(3) B, A, D, E, C (4) A, D, B, E, C

183. If pH of the blood of a person **decreases** then;
(1) heart rate decreases.
(2) blood supply to the other organs decreases.
(3) affinity of haemoglobin for oxygen decreases.
(4) affinity of haemoglobin for oxygen increases.

184. The hepatic portal vein carries blood from **___A___** to the **__B__** before it is delivered to the systemic circulation.
Choose the **correct** option representing **A** and **B**.

	A	**B**
(1)	Liver	heart
(2)	Intestine	heart
(3)	Intestine	liver
(4)	Liver	intestine

185. Which of the following option **correctly** defines functional residual capacity?
(1) Total volume of air a person can inspire after a normal expiration.
(2) Volume of air that will remain in the lungs after a normal expiration.
(3) Total volume of air a person can expire after a normal inspiration.
(4) The maximum volume of air a person can breathe in after a forced expiration.

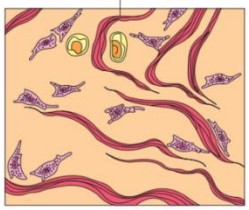
SECTION-B

186. **Statement I:** Connective tissues are most abundant and widely distributed in the body of complex animals.
Statement II: Connective tissues are named because of their special function of linking and supporting other tissues/organs of the body.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

187. How many of the following statements are **true** regarding exchange of gases?
A. O_2 and CO_2 are exchanged in alveoli and tissues by simple diffusion mainly based on pressure/concentration gradient.
B. As the solubility of O_2 is 20-25 times higher than that of CO_2, the amount of O_2 that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher compared to that of CO_2.
C. pCO_2 is 40mmHg in alveoli and 45 mmHg in deoxygenated blood.
D. pO_2 is 95 mmHg in tissue and 40 mmHg in oxygenated blood.
(1) One
(2) two
(3) Three
(4) Four

188. Which one of the following is the **correct** match for peaks of ECG?
(1) P-wave – relaxation of atria
(2) Q wave – end of systole
(3) T-wave – depolarization of auricles
(4) QRS complex – depolarization of ventricles

189. Identify the tissue represented by given figure.



(1) Loose connective tissue
(2) Dense regular connective tissue
(3) Dense irregular connective tissue
(4) Adipose tissue

190. In the regulation of respiration, receptors associated with _____and carotid artery also can recognize changes in CO_2 and H^+ concentration and send necessary signals to the _____ for remedial actions.
(1) pulmonary arch: neural centre
(2) aortic arch; rhythm centre
(3) carotid arch; pneumotaxic centre
(4) aortic arch; heart

191. **Assertion (A):** Each artery and vein consist of three layers namely the tunica intima, the tunica media and the tunica externa.
Reason (R): The tunica media is comparatively thick in veins as compared to artery.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is the correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not the correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

192. How many of the following statements regarding specialized connective tissue are **true**?
A. The intercellular material of cartilage is solid and pliable and resists compression.
B. Most of the cartilages in vertebrate are replaced by bones in embryos.
C. Blood is a fluid connective tissue containing plasma, red blood cells (RBC), white blood cells (WBC) and platelets.
D. The bone cells (osteocytes) are present in the spaces called lacunae.
(1) One
(2) Two
(3) Three
(4) Four

193. Which of the following statements are **correct** regarding carbonic anhydrase?
(1) This enzyme is essential for conversion of CO_2 and water into carbamino-hemoglobin and vice versa.
(2) It is present in large amounts in plasma.
(3) Small quantities of it are also present in the RBCs.
(4) This enzyme is essential in 70 percent of transport of CO_2.

194. Match **List-I** with **List-II** and choose **correct** option.

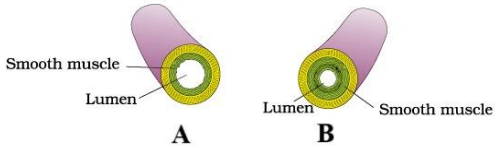
	List -I		**List -II**
A	Deoxygenated blood	I	Blood to liver from intestine
B	Oxygenated blood	II	Blood supply to cardiac muscles
C	Hepatic portal system	III	Pulmonary artery
D	Coronary circulation	IV	Pulmonary vein

(1) A-III, B-IV, C-I, D-II
(2) A-IV, B-I, C-II, D-III
(3) A-I, B-IV, C-III, D-II
(4) A-IV, B-III, C-I, D-II

195. Choose the option which **correctly** explain the function of mast cells in connective tissue.
(1) Release of collagen fibres
(2) Secretion of serotonin and melanin
(3) Secretion of heparin and histamine
(4) Secretion of extracellular fluid

196. **Statement I:** Breathing or pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.
Statement II: Pulmonary ventilation is also called cellular respiration and involves exchange of gases between atmospheric air and alveoli.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

197. Choose the **correct** option regarding the image given below.



(1) **A-** Artery; **B-** Vein
(2) **A-** Vein; **B-** Artery
(3) **A-** Capillary; **B-** Vein
(4) **A-** Artery; **B-** Capillary

198. Bones have a hard and non-pliable ____**X**_____ rich in calcium salts and ___**Y** _____which give bone its strength.

	X	**Y**
(1)	inorganic salts	phosphorus
(2)	intracellular matrix	inorganic salts
(3)	ground substance	collagen fibres
(4)	matrix	cartilage

199. **Assertion (A):** The tracheae, primary, secondary and tertiary bronchi, and initial bronchioles are supported by complete cartilaginous rings.
Reason (R): The branching network of bronchi, bronchioles and alveoli comprise the lungs.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is the correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not the correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

200. Which of the following is a consequence of non-functional chordae tendineae?

(1) Reduced blood flow in the pulmonary artery.
(2) Reduced blood flow in the pulmonary vein.
(3) Non-functional SA node.
(4) Defect in the heart beat.

■■■

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